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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/526,278
Filing Date: March 01, 2005
Appellant(s): BLOCK ET AL.

Paul Pysher (Reg. No. 40,780)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 07/15/2010 appealing from the Office action mailed 12/10/2009.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 22-44 are rejected and pending in this application.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office

action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5,521,561	Yrjölä et al.	5-1996
6,822,295	Larson	11-2004
6,525,346	Mizutani	2-2003
5,122,921	Koss	6-1992
4,977,357	Shrier	12-1990
6,272,327	Kurchuk et al.	8-2001
JP 2000134945 A	Toshiba Corp	5-2000
5,276,422	Ikeda et al.	1-1994
6,072,993	Trikha et al.	6-2000
2002/0080537	Landy	6-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections – 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 22-24, 26-29, 31 & 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä et al. (US 5,521,561) in view of Larson (US 6,822,295).

With regard to claim 22, Yrjölä, in Figure 2, discloses circuitry for use in a mobile telephone (column 1 lines 13-21) comprising: a terminal (A) for use with a high-frequency signal; at least two signal lines (R & T); a switching unit (K) for connecting the terminal to a signal line.

Yrjölä does not teach a primary protection device for protecting against electrostatic discharges, the primary protection device being between the terminal and the switching unit, the primary protection device comprising a first element that diverts all voltages having a pulse height greater than a 200 V switching voltage to a reference potential.

Larson, in figure 1, and column 2 lines 6-19, teaches a device for receiving an RF signal from a terminal (112) wherein the device is prone to damage caused by surge voltages. The device is designed for use with RF signals in the microwave range from 900 MHz – 5.8 GHz (column 1 lines 36-45), which is the frequency band in which TDMA mobile phones operate. The device comprises a primary protection device (103, 104 & 106) being between a terminal (112) and a protected receiving device (111), the primary protection device comprising a first element (103, 104 & 106) that diverts all voltages having a pulse height greater than a 200 V switching voltage to a reference potential (column 6 lines 60-63).

Larson teaches that when the voltage at the terminal rises above 8 volts, which is the reverse breakdown voltage (6.5 V) of the zener diode (106) plus a forward biasing voltage of the PiN diode (101), the circuit will divert the voltage to ground.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä with Larson, by providing the circuit protection of Larson into the device of Yrjölä for the purpose of protecting the RF equipment of Yrjölä without degrading the signal quality.

With regard to claims 23 & 24, Yrjölä in view of Larson teaches the circuitry of claim 22.

Yrjölä in view of Larson further teaches that the first element has an insertion attenuation that is less than 0.3 dB (column 6 lines 3-11), and that the first element has a capacitance that is less than 1 pF (column 8 lines 1-7).

With regard to Claim 26, Yrjölä in view of Larson discloses the circuitry of Claim 22. Larson further discloses that the primary protection device comprises a circuit path (from 107 to 108) that connects the terminal and the switching unit; and wherein the first element (103, 104 & 106) connects the circuit path to the reference potential.

With regard to Claim 27, Yrjölä in view of Larson discloses the circuitry of Claim 22. Larson, in Fig. 2 further discloses a second element (101 & 102) that is in parallel with the first element, the second element for limiting a current load of the first element (column 3 lines 51-60).

With regard to Claim 28, Yrjölä in view of Larson discloses the circuitry of Claim 27. Larson further discloses a capacitor (105) on a circuit path between the first element (103, 104) and the second element (101, 102).

With regard to Claims 29 & 31, Yrjölä in view of Larson discloses the circuitry of claim 27. Siemens further discloses that the second element comprises is a discharger (101 & 102 discharges the current to ground) having a capacitance of less than 1 pF (column 6 lines 2-13).

With regard to claim 41, Yrjölä in view of Larson teaches the circuitry of claim 22.

Yrjölä further teaches an arrangement for separating transmission and reception wherein a gallium arsenide switch is used to connect a transmitter and a receiver to a single antenna.

With regard to claims 42 & 43, Yrjölä in view of Larson discloses the circuitry of claim 22, comprising an antenna and wherein the signal lines comprise transmitting and receive paths.

Yrjölä et al, in figure 10, teaches an antenna connected to a separate transmitter and receiver through a switch wherein the circuit is part of a mobile phone (column 1 lines 1-12).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable Yrjölä in view of Larson as applied to claim 22 above, and further in view of Mizutani (US 6,525,346)

With regard to Claim 25, Yrjölä in view of Larson teaches the circuitry of claim 22. Larson further discloses that the first element comprises a double PiN diode ((103 & 104).

Yrjölä in view of Larson does not teach the first element comprises a gallium arsenide double diode.

Mizutani, in Figure 14, teaches that a PiN diode can be constructed from GaAs (column 8, lines 45-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson with Mizutani,

by constructing the double diodes taught by Larson with gallium arsenide, for the purpose of providing greater protection to the switching unit by increasing the switching speed of the protection circuit.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä in view of Larson and further in view of Koss (US 5,122,921).

With regard to claim 32, Yrjölä in view of Larson discloses the device of claim 27.

Yrjölä in view of Larson does not teach that the second element comprises an inductive element having an inductance that is greater than 18 nH (column 4 lines 45-49).

Koss an arrangement similar to the protection of Larson wherein there is a capacitor and a first and a second element to protect a device. Koss teaches that a second element comprises an inductive element having an inductance that is greater than 18 nH (column 4 lines 45-49).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson with Koss, by incorporating the second element of Koss into the device Yrjölä in view of Larson, for the purpose of shunting transients that are too fast to trigger the protection device of Yrjölä in view of Larson (Koss column 5 line 64-column 6 line 14).

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä in view of Larson as applied to claim 22 above, and further in view of Shrier (US 4,977,357).

With regard to Claim 30, Yrjölä in view of Larson teaches the circuitry of claim 22. Yrjölä in view of Larson does not teach that the second element comprises a polymer suppressor.

Shrier, teaches a protection element comprising a polymer suppressor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson with Shrier, by incorporating the device of Shrier into the device of Yrjölä in view of Larson, for the purpose of providing a protection device that can respond to repetitive electrical transients with nanosecond rise times and have low electrical capacitance (column 1 lines 12-18).

Claims 33, 35 & 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä in view of Larson as applied to claim 22 above, and further in view of Kurchuk et al. (US 6272327).

With regard to Claim 33, Yrjölä in view of Larson teaches the circuitry of claim 22.

Yrjölä in view of Larson does not teaches that circuit paths that provide control signals to the switching unit, each of the circuit paths comprising a secondary protection device against electrostatic discharges.

Kurchuk et al., in Figure 2, teaches a high power wireless telephone with over-voltage protection, comprising circuit paths (36 & 38) that provide control signals to the switching unit (24), each of the circuit paths comprising a secondary protection device (44 & 46) against electrostatic discharges (column 3 lines 66 & 67 & column 4 lines 1-4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson with Kurchuk et al., by Replacing the diplexer (3) taught by Yrjölä in view of Larson, with the switching unit taught by Kurchuk, for the purpose of providing a mobile phone with a switching unit that prevents receiver overloading without degrading the receiver sensitivity (Kurchuk et al. Column 2 lines 31-35).

With regard to Claim 35, Yrjölä in view of Larson and Kurchuk discloses the circuitry of Claim 22. Kurchuk further discloses that the switching units comprises field effect transistors (Q1 & Q2), a contact break distance of each of the field effect transistors connecting the terminal (30) to the signal line (32 & 34), and wherein the circuitry further comprises: circuit paths that connect to gates of the field effect transistors, the circuit paths (40 & 42) for providing control signals to the gates, each of the circuit paths comprising a secondary protection device (44 & 46) for protecting against electrostatic discharges.

With regard to Claim 34, Yrjölä in view of Larson and Kurchuk discloses the circuitry of Claim 35. Kurchuk further discloses that at least one secondary protection device (44) is connected to the reference potential.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä in view of Larson as applied to claim 22 above, and further in view of Toshiba (JP 02000134945).

With regard to Claim 34, Yrjölä in view of Larson teaches the circuitry of claim 22.

Yrjölä in view of Larson does not teach that the circuitry further comprises a circuit path for supplying for an operating voltage to the switching unit, the circuit path comprising a secondary protection device for protecting against electrostatic discharges.

Toshiba, in Figure 1, teaches a surge protection circuit for a switching unit (4) the circuit path supplies an operating voltage to the switching unit and the path comprises a protection device (6) for protecting against electrostatic discharges.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson with Toshiba, by protecting power terminal of the switching network taught by Yrjölä in view of Larson, with the protection device taught by Toshiba for the purpose of bypassing surge currents and voltages in the event of a line fault.

Claims 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä in view of Larson and Kurchuk as applied to claim 33 above, and further in view of Ikeda et al. (US 5276422).

With regard to Claims 36-38, Yrjölä in view of Larson and Kurchuk teaches the circuitry of claim 36 and further teaches that the voltage limiting element comprises a zener diode (106) having a switching voltage that is less than 100 V as explained above.

Yrjölä in view of Larson and Kurchuk et al. does not teach that the voltage limiting element comprises a varistor.

Ikeda teaches a device to protect a load. The device contains an element (14) that absorbs surge voltages. Ikeda further teaches that the element (14) can be a CR filter, a varistor or a zener diode (column 3 lines 66-68 & column 4 lines 1-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson and Kurchuk with Ikeda, by using the varistor of Ikeda as the zener diode taught by Larson, for the purpose of providing a voltage limiting element with a fast reaction time that increases the switching speed of the switching unit.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä in view of Larson as applied to claim 22 above, and further in view of Trikha et al. (US 6,072,993)

With regard to Claim 40, Yrjölä in view of Larson discloses the circuitry of claim 22.

Yrjölä in view of Larson does not teach that the switching unit comprises PIN diodes.

Trikha, in Figure 3A, teaches a diplexer for a cellular phone wherein the switching element comprises pin diodes (116', 118', 120', & 122').

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson with Trikha, by replacing the switching unit taught by Yrjölä in view of Larson with the diplexer taught by Trikha, for the purpose of using the device in high frequency applications.

Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yrjölä in view of Larson and further in view of Landy (2002/0080537).

With regard to claim 44, Yrjölä in view of Larson teaches the circuitry of claim 22.

Yrjölä in view of Larson does not teach that the switching unit and the primary protection device are integrated into a multi-layer ceramic substrate.

Landy, in Figure 1, teaches an ESD protected RX/TX switch circuit wherein the switch and the ESD protection are implemented as an RF integrated circuit which would necessarily comprise a multi-layer ceramic substrate.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yrjölä in view of Larson with Landy, by

incorporating a primary protection device and switch into one single unit on a multi-layer ceramic substrate, for the purpose of making the circuit more easy to mass produce thus decreasing the cost of the device.

(10) Response to Argument

Appellant disagrees with the rejection of independent claim 22 made under 35 USC §103 as being obvious over Yrjölä in view of Larson. Specifically, Appellant argues that neither Yrjölä nor Larson discloses the recitation that "a first element diverts all voltages having a pulse height greater than a 200V switching voltage to a reference potential". Applicant first explains the Larson reference and examines column 3 lines 7-28 and column 3 line 48 - column 4, line 13, the former of which describes how the circuit operates during a highly positive high voltage event and the latter describing how the circuit operates during a highly negative high voltage event.

As Appellant points out, when a highly positive voltage is placed on the input pad taught by Larson, the PiN diode (101) and the zener diode (106) divert all voltages over a certain threshold *(8 volts as taught by Larson in paragraph 6 lines 62-65, far below the 200 V required by the claim)* to the reference potential (110). Appellant then points out that when a highly negative voltage is placed on the input pad, PiN diode 102 forward biases and diverts all voltage less than a forward breakdown voltage of the PiN diode (roughly -0.7 volts) to the reference potential.

From this teaching, Appellant concludes that Larson does not teach the claimed language because Larson uses both the PiN diode (101) and zener diode (106) to divert

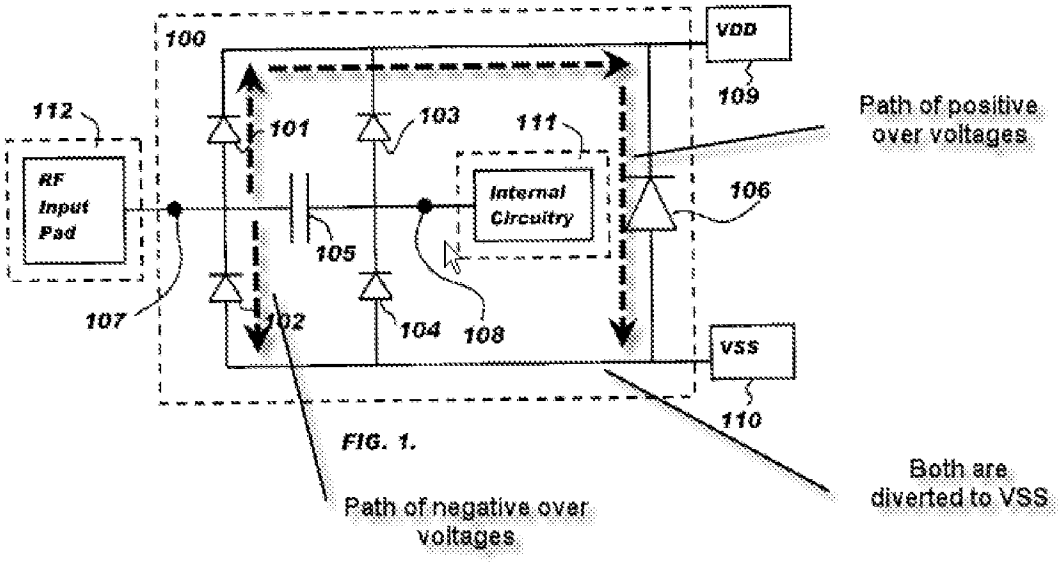
all highly positive voltages and uses the PiN diode (102) to divert all highly negative values. Appellant argues that this teaching is important because the recitation that the first element, "diverts all voltages having a pulse height greater than a 200V switching voltage to a reference potential", means that all voltages with positive and negative values (+200V & -200V) must be diverted to the reference potential.

In response, it is first noted that the claim 22 does not clearly state that the phrase "a pulse height greater than a 200 V switching voltage" must include both positive and negative values. In general, a voltage that is described as being +200V more positive than a reference voltage is **greater** than the reference voltage and a voltage that is described as being -200V more negative than the reference voltage would be **less** than the reference. It is believed that one of ordinary skill in the art would recognize that a voltage that is more positive than a reference is greater than the reference and that a voltage that is more negative than the reference is less than the reference. If Appellant believes that the language of claim 22, in its current form, requires that all voltages that are 200V above and below a reference potential are shunted to the reference potential, then amending the claim to more precisely state this feature would not further limit the claim. While it may be true that the magnitude of a voltage is not positive or negative, no mention is made of the magnitude of the voltages in the claim. As such, it is believed that the claims only require that the device shunt voltages that are 200V more positive than the reference potential.

Regardless of this argument, it is believed that Larson does in fact teach that a first element diverts all positive and negative voltages with pulse heights greater than or less than 200V to the reference potential. As mentioned above, Larson teaches that all positive voltages are diverted to the reference potential via the PiN diode 101 and zener diode 106 and that all negative voltages are diverted to the reference potential through PiN diode 102. In the two paragraphs of Larson that Appellant highlights on page 9 of the appeal brief, Appellant underlines the sections of Larson that teaches this feature. Larson teaches that " *A highly positive voltage event at the signal node will cause the first positive voltage PiN diode 101 to switch from reverse bias mode to a forward bias mode resulting in most of the current flowing through the first positive voltage PiN diode 101*" and that "*A highly positive voltage at the positive voltage source 109 created by the flow of current through the positive voltage PiN diodes 101 or 103 may cause the Zener diode 106 to "breakdown" and further shunt the positive voltage to the negative voltage source 110*" (column 3 lines 51-65 & column 3 line 67-column 4 line 13). As such, when a voltage at the input rises 0.7 voltage above VDD, the voltage is diverted to VDD, if this voltage is also a zener voltage (8V) above the reference in addition to the .07V above ground, the zener diode 106 will break down and divert the voltage to the reference (110). Therefore, when the voltage at input 107 rises roughly a little higher than 9 volts, it will be shunted to the reference voltage 110 through the path of PiN diode 101 and zener diode 106.

Larson then teaches that when the voltage falls below the threshold voltage of PiN diode102 it forward biases and diverts the voltage to the reference voltage as well.

This teaching is underlined by Appellant as well on page 9 of the appeal brief and found in the Larson reference at column 4 lines 14-18, which states "*A highly negative voltage event at the signal node 107 will cause the first negative voltage PiN diode 102 to switch from reverse bias mode to a forward bias mode resulting in most of the current flowing through the first negative voltage PiN diode 102*". As can be seen, Larson clearly shows that positive and negative values greater than 200V in the positive and negative direction (+8.7V and above & -0.7V and below) will be diverted to the reference potential. This can further be demonstrated in Larson's annotated Fig. 1 below:



As it has been shown that the two PiN diodes and the zener diode divert all positive and negative voltages great than 200V to the reference potential, it has further been pointed out in the previous final rejection that the devices comprising the PiN diode (101), PiN diode (102) and zener diode (103) could all be taken together to be the

claimed "first element" as the first element is not defined in the claim other than to describe the function it performs. Indeed, a look at Appellant's Fig. 2 shows that the first element can comprise two diodes in series.

In response Appellant states that it is not merely the crux of the argument that there is a single first element but instead that the first element diverts all voltages regardless of polarity. As explained above, the three elements above divert all polarities of voltage to the reference potential. It is true that Larson diverts the voltages in a different way than Appellant, however, the present claims do not limit the invention such that these differences overcome the rejection. It is true that in Larson, a highly positive voltage will first be shunted to VDD which then floats until it reaches 8V above the reference potential, after which it is diverted to the reference through the zener diode. There is no language in the claims stating that the voltage cannot first be diverted to another bus before being diverted to the reference. Applicant could overcome the rejection by amending the claim to state that the first element requires that the positive and negative voltages be diverted through the same path. However, as presently written, it is believed that Yrjola in view of Larson does teach all the language of claim 22.

In conclusion, while Larson teaches that excess positive voltage is diverted to VDD (109), this voltage is further diverted to VSS when the zener breaks down which would happen well before the 200V as claimed in claim 22. As such all voltages with a pulse height of 200V will be diverted to the reference potential. It may travel through Pin diode 101 and zener diode 106, or it may travel through PiN diode 102, all making

up the first element. As such it is believed that claim 22 was rejected properly and that the rejection should be sustained. It is believed that all claim arguments have been addressed.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Scott Bauer

/SAB/

08 OCT 10

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